## I. General Information

CAS Number: 104-38-1
Common Name: Hydroquinone bis(2-hydroxyethyl)ether

## II. Physicochemical Data

### A. Melting Point

**Test Substance**

Identity: Hydroquinone bis (2-hydroxyethyl) ether (CAS RN 104-38-1)
Remarks: None

**Method**

Method: Calculated value
Remarks: None

**Results**

Melting Point Value: 101.5-102.3°C
Remarks: None

**Reference**

Pirrung, M. C. and D. S. Nunn. 1996. Tetrahedron, CODEN: TETRAB, 52 (16): 5707-5738. BABS-6023959.

**Other**

**B. Boiling Point**

**Test Substance**

| | |
|---|---|
| Identity: | Hydroquinone bis (2-hydroxyethyl) ether (CAS RN 104-38-1) |
| Remarks: | None |

**Method**

| | |
|---|---|
| Method: | Estimation |
| Remarks: | Adapted from Stein & Brown method |

**Results**

| | |
|---|---|
| Boiling Point Value: | 343.86$^{o}$C |
| Remarks: | None |

**Reference** MPBPWIN v1.40 (EPI Suite™ v.3.10). Downloadable at http://www.epa.gov/oppt/exposure/docs/episuitedl.htm ©2000 U.S. Environmental Protection Agency.

**Other**

## C. Vapor Pressure

Robust summary will be supplied when available from study data.

## D. Partition Coefficient

**Test Substance**

| | |
|---|---|
| Identity: | Hydroquinone bis (2-hydroxyethyl) ether (CAS RN 104-38-1) |
| Remarks: | None |

**Method**

| | |
|---|---|
| Method: | Estimation |
| Remarks: | None |

**Results**

| | |
|---|---|
| $K_{ow}$: | 0.61 |
| Remarks: | None |

**Reference** KOWWIN v.1.66. (EPI Suite™ v.3.10). Downloadable at http://www.epa.gov/oppt/exposure/docs/episuitedl.htm ©2000 U.S. Environmental Protection Agency.

**Other**

## E. Water Solubility

**Test Substance**

| | |
|---|---|
| Identity: | Hydroquinone bis (2-hydroxyethyl) ether (CAS RN 104-38-1) |
| Remarks: | None |

**Method**

| | |
|---|---|
| Method: | Calculated value |
| Remarks: | None |

**Results**

| | |
|---|---|
| Value: | 11,695 mg/l |
| Temperature: | 25°C |
| Remarks: | None |

**Reference** Molyneux, P. and S. Vekavakayanondha. 1986. J. Chem. Soc. Faraday Trans. 1. Vol. 82: 291-318.

**Other**

## III. Environmental Fate Endpoints

### A. Photodegradation

**Test Substance**

| | |
|---|---|
| Identity: | Hydroquinone bis (2-hydroxyethyl) ether (CAS RN 104-38-1) |
| Remarks: | None |

**Method**

| | |
|---|---|
| Method: | Estimation |
| Test type: | Atmospheric oxidation |
| Remarks: | None |

**Results**

| | |
|---|---|
| Hydroxyl radicals reaction: | |
| OH Rate Constant: | 40.9385 x $10^{-12}$ $cm^3$/molecule-sec |
| Half-life: | 0.261 days (12-hr day; 1.5 x $10^6$ OH/$cm^3$ |
| Temperature: | $25^0$C |
| Ozone reaction: | No ozone reaction estimation was noted. |
| Remarks: | None |

**Conclusions** The material is expected to rapidly degrade in the atmosphere.

**Reference** AopWin v1.90. (EPI Suite™ v.3.10). Downloadable at http://www.epa.gov/oppt/exposure/docs/episuitedl.htm ©2000 U.S. Environmental Protection Agency.

**Other**

**B. Stability in Water**

**Test Substance**

| | |
|---|---|
| Identity: | Hydroquinone bis (2-hydroxyethyl) ether (CAS RN 104-38-1) |
| Purity: | > 99% |
| Remarks: | None |

**Methods**

| | |
|---|---|
| Method: | OECD TG-111 |
| Type: | Hydrolysis as a function of pH |
| GLP: | Yes |
| Year: | 2003 |
| Remarks: | Hydrolysis of HQEE was determined at 3 different pH values; 4.0, 7.0 and 9.0. The pH 4 solution was prepared as a 0.01 M sodium acetate buffer. It was prepared by weighing 0.82 grams of anhydrous sodium acetate into a l liter volumetric flask and adding 900 mL of distilled water. The pH was adjusted to 4.0 with concentrated acetic acid and diluted to the mark with distilled water. pH 7.0 solution was prepared as a 0.01 M phosphate buffer. It was prepared using 1.4 grams of potassium phosphate monobasic crystal per liter of solution. The pH was adjusted to 7.0 with 1 N sodium hydroxide and/or hydrochloric acid and diluted to the mark with distilled water. pH 9.0 solution was prepared as a 0.025 M sodium borate buffer. It was prepared by weighing 9.5 grams of sodium borate decahydrate into a 1 liter volumetric flask and adding 900 mL of distilled water. The pH was adjusted to 9.0 with sodium hydroxide and/or hydrochloric acid and diluted to the mark with distilled water. The buffers were autoclaved prior to use in order to remove any microbes and oxygen from the solutions. A preliminary test was conducted to determine the saturation concentration of the test material. It was determined to be 5,120 mg/l. For the main study the concentration of HQEE was 28 mg/l, which is less than the approximate half-saturation concentration and less than 0.01 M based on a molecular weight of 198. At each pH, 500 ml of test solution was subdivided into 33 vessels each containing 14 ml. The vessels were tightly capped, wrapped in aluminum foil to |

exclude light, and incubated at 50 ± 1° C in a water bath. Three vessels were taken at each time point (0, 0.5, 1.0, 1.5, 3.25, 3.75, 24, 48, 72, 96, and 120 hours) and analyzed for the test substance. Appropriate controls were used as blanks for analysis.

**Results**

At pH 4, 7, and 9 the average measured concentration of the test article after 5 days residence in water at 50° C was 27.6, 29.1, and 29.2 mg/l, respectively. The data for all time points is presented in table 1. Each value is the mean ± standard deviation of 3 replicates.

Table 1. Measured Concentration of HQEE (mg/l)

| Time (hours) | pH 4.0 | pH 7.0 | pH 9.0 |
|---|---|---|---|
| 0 | 28.4±0.1 | 28.2±0.3 | 28.2±0.5 |
| 0.5 | 28.5±0.3 | 28.2±0.3 | 28.6±0.3 |
| 1.0 | 28.4±0.2 | 28.5±0.5 | 28.7±0.4 |
| 1.5 | 28.3±0.1 | 28.5±0.5 | 28.7±0.5 |
| 3.25 | 28.5±0.1 | 28.7±0.2 | 28.2±0.1 |
| 3.75 | 28.5±0.1 | 28.2±0.4 | 28.5±0.5 |
| 24 | 28.3±0.2 | 28.3±0.1 | 28.5±0.2 |
| 48 | 28.4±0.1 | 28.7±0.2 | 28.7±0.4 |
| 72 | 28.0±0.2 | 28.7±0.3 | 28.7±0.3 |
| 96 | 27.9±0.2 | 29.0±1.8 | 28.6 ±0.3 |
| 120 | 27.6±0.3 | 29.1±0.4 | 29.2±0.4 |

**Conclusions** HQEE is considered to be hydrolytically stable ($t_{1/2}$ > 1 year) based on the recovery of > 90 % of the test article from 5 day old samples in water buffered to pH 4, 7, or 9.

**Data Quality**

Reliability: 1A

Remarks: Reliable without restrictions; Guideline study (OECD TG-111).

**References**

Ward, T. J., C. C. Rondon, and R. L. Boeri. 2003. HQEE [Hydroquinone bis(2-Hydroxyethyl)Ether], CAS # 104-38-1: Hydrolysis as a Function of pH. T. R. Wilbury Laboratories, Inc. Study Number 2565-AR. Marblehead, MA.

**Other**

## C. Biodegradation – Entry 1 of 2

Robust summary for ready biodegradability will be supplied when available from study data.

**Biodegradation – Entry 2 of 2**

**Test Substance**

| | |
|---|---|
| Identity: | Hydroquinone bis (2-hydroxyethyl) ether (CAS RN 104-38-1) |
| Purity: | > 99.9% |
| Remarks: | None |

**Method**

| | |
|---|---|
| Method: | OECD TG-302B |
| Test type: | Zahn-Wellens/EMPA test for inherent biodegradability. |
| GLP: | Yes |
| Year: | 1995 |
| Contact time: | 28 days |
| Inoculum: | Microorganisms obtained from mixed liquor suspended solids from Van Lare Waste Water Treatment Plant, Rochester, NY. |
| Remarks: | The test article solution (500 ml) was prepared in duplicate using 2-L Erlenmeyer flasks. The positive control solution (sodium benzoate) was prepared using a single Erlenmeyer flask. The theoretical concentration of test article and positive control was 50 mg DOC/L. Another flask served as a blank control. The vehicle was mineral nutrient solution. The incubation temperature was 21-22$^0$ C. All vessels were inoculated with 100 ml of the inoculum to achieve 0.2 – 1.0 g/L of suspended solids in the final test solution. The DOC, pH and dissolved oxygen were determined on days 1, 4, 6, 8, 11, 15, 18, 22, 25, 27 and 28. DOC concentrations were determined in triplicate using a Dohrmann DC-180 Carbon Analyzer. The instrument was calibrated using a 10 ppm organic carbon standard. The DOC concentrations were determined to nearest 0.1 mg/L and expressed as the arithmetic mean. |

**Results**

| | |
|---|---|
| Degradation %: | The starting DOC concentration of the test article solutions A and B and the positive control was 40.8 ppm, 42.6 ppm and 41.2 ppm, respectively. On day 28, DOC concentration for test article solutions A and B and the positive control was 1.0 ppm, 1.3 ppm and 3.4 ppm, respectively. These values |

represent a loss of 97 % DOC for the test article and 92 % DOC for the positive control.

| | Degradation Rate (%) | |
|---|---|---|
| Sample time (day) | Test Article | Positive Control |
| 1 | 16 | 96 |
| 4 | 1 | 87 |
| 6 | 3 | 68 |
| 8 | 0 | 105 |
| 11 | 11 | 102 |
| 15 | 65 | 99 |
| 18 | 97 | 99 |
| 22 | 95 | 96 |
| 25 | 101 | 87 |
| 27 | 101 | 99 |
| 28 | 97 | 92 |

Classification: The test article is inherently biodegradable under the definition of this test.

Kinetic: Not stated

Breakdown products: Not stated

Remarks: The positive control had a DOC removal exceeding 70% within 14 days. This fulfills the requirements of a valid test. No protocol deviations were noted.

**Conclusions**

The results indicate that the test material undergoes rapid biodegradation and would not be expected to be persistent in the environment.

**Data Quality**

Reliability: 1A

Remarks: Reliable without restrictions; Guideline study (OECD TG-302B).

**Reference**

Lawrence, D. L. and C. J. Ruffing. 1995. Determination of Inherent Biodegradability (Biotic Degradation) Using the Zahn-Wellens/EMPA Test. Environmental Sciences Section, Health and Environment Laboratories, Eastman Kodak Company, Rochester, NY. Study No. EN-111-023646-1.

**Other**

## D. Transport between Environmental Compartments (Fugacity)

Robust summary will be supplied when all data components are available.

## IV. Ecotoxicity

### A. Acute Toxicity to Fish

**Test Substance**

| | |
|---|---|
| Identity: | Hydroquinone bis (2-hydroxyethyl) ether (CAS RN 104-38-1) |
| Purity: | >99.9% initial and 99.9% final, using gas chromatography with flame ionization detection |
| Remarks: | None |

**Method**

| | |
|---|---|
| Method: | OECD TG-203 |
| Test type: | Acute static |
| GLP: | Yes |
| Year: | 1995 |
| Species/strain: | Fathead minnow (*Pimephales promelas*) |
| Analytical monitoring: | The concentration of the test substance was determined analytically using high performance liquid chromatography with an ultraviolet detector. The test substance was measured at study time 0 and 96 hours. |
| Exposure period: | 96 hours |
| Statistical methods: | The $LC_{50}$ and 95 % confidence level at various time points (24, 48, 72, and 96 hours) during the study were determined using the following three approaches: non-linear interpolation, moving average method and probit method. |
| Remarks: | The test organisms were exposed to 5 analytically determined concentrations that ranged from 86 to 1044.2 mg test article/l of water. The aquatic test was performed in seamless Pyrex glass 30.5 cm cuboidal chromatography jars, each containing 20 L of exposure solution. The light/dark cycle of the photoperiod was 16 hours on/8 hours off with a 20 minute transition period. The temperature in all test vessels remained at $20 \pm 1^{o}$ C during the test. The pH and oxygen ranged from 8.0 to 8.6 and 8.6 to 9.2 mg/l, respectively. Observations for mortality and signs of stress were made during the study at 0, 2.5, 24, 48, 72 and 96 hours. After the measurements for physical parameters were performed at time 0, the minnows were placed into each of the replicate test article concentration vessels and replicate control vessels. They were |

approximately 37 days old at the start of testing. Two replicates were used for each concentration with 10 minnows per vessel for a total of 20 fish per concentration. All organisms for this test were acclimated to the diluent water prior to the test since the same filtered-treated-tempered water and filtered, compressed air used for all laboratory water/aeration processes during the test were supplied continuously to the stainless steel rearing tanks. All organisms used in this test were maintained in this water for at least two weeks before being exposed to the test article.

**Results**

Analytical concentrations: Mean of values determined at 0 and 96 hours of test
Control – no test article detected
86 mg/l, 168.3 mg/l, 312.8 mg/l, 570.4 mg/l and 1044.2 mg/l.

Mortality:

Percent Mortality

| Concentration (mg/l) | Time (hours) | | | | |
|---|---|---|---|---|---|
| | 2.5 | 24 | 48 | 72 | 96 |
| Control | 0 | 0 | 0 | 0 | 0 |
| 86 | 0 | 0 | 0 | 0 | 0 |
| 168.3 | 0 | 0 | 0 | 0 | 0 |
| 312.8 | 0 | 5 | 5 | 5 | 5 |
| 570.4 | 0 | 0 | 0 | 0 | 0 |
| 1044.2 | 0 | 0 | 0 | 0 | 0 |

Values: $LC_{50}$ (95% confidence limits) (mg/l)

| 24-hr | 48-hr | 72-hr | 96-hr |
|---|---|---|---|
| >1043.7 | >1043.7 | >1043.7 | >1043.7 |

NOEC (mg/l)

| 24-hr | 48-hr | 72-hr | 96-hr |
|---|---|---|---|
| >1043.7 | >1043.7 | >1043.7 | >1043.7 |

Remarks: None

**Data Quality**

Reliability: 1A
Remarks: Reliable without restrictions; Guideline study (OECD 203).

| | |
|---|---|
| **Reference** | Lawrence, D. L. and M. P. Hirsch. An Acute Aquatic Effects Test with the Fathead Minnow, *Pimephales promelas* using Hydroquinone bis (2-Hydroxyethyl) Ether. Eastman Kodak Company, Rochester, NY. Study No. EN-430-023646-1; HAEL No. 94-0220. 1995. |
| **Other** | |

## B. Acute Toxicity to Invertebrates

**Test Substance**

| | |
|---|---|
| Identity: | Hydroquinone bis (2-hydroxyethyl) ether (CAS RN 104-38-1) |
| Purity: | >99.9% initial and 99.9% final, using gas chromatography with a flame ionization detector |

**Method**

| | |
|---|---|
| Method: | OECD TG-202 |
| Type: | Acute static |
| GLP: | Yes |
| Year: | 1995 |
| Species/strain: | Water flea (*Daphnia magna*) |
| Analytical monitoring: | The concentration of the test substance was determined analytically using high performance liquid chromatography with ultra violet detection. The test substance was measured at study time 0 and 48 hours. |
| Exposure period: | 48 hours |
| Statistical methods: | The $LC_{50}$ and 95 % confidence level at various time points (24 and 48 hours) during the study were determined using the following three approaches: non-linear interpolation, moving average method and probit method. |
| Remarks | The test organisms were exposed to 5 analytically determined concentrations that ranged from 100.2 to 992.9 mg test article/l of water. The aquatic test was performed in 250-ml Pyrex glass beakers. The light/dark cycle of the photoperiod was 16 hours on/8 hours off with a 20 minute transition period. The temperature in all test vessels remained at 21$^{o}$ C during the test. The pH and oxygen ranged from 8.1 to 8.3 and 8.4 to 8.9 mg/l, respectively. Observations signs of immobility and stress were made during the study at 0, 6, 24 and 48 hours. After the measurements for physical parameters were performed at time 0, neonate daphnids were placed into each of the replicate test article concentration vessels and replicate control vessels. Two replicates were used for each concentration with 10 daphnids per vessel for a total of 20 organisms per concentration. All daphnids for this test were acclimated to the diluent water prior to the test since the same filtered-treated-tempered water |

and filtered, compressed air used for all laboratory water/aeration processes during the test were supplied continuously to the stainless steel rearing tanks. All organisms used in this test were maintained in this water for at least two weeks before being exposed to the test article.

**Results**

Analytical concentrations: Mean of values determined at 0 and 48 hours of test
Control – no test article detected
100.2 mg/l, 188.1 mg/l, 325.5 mg/l, 553.5 mg/l and 992.9 mg/l

Immobility:

| Concentration (mg/l) | Percent Immobile Time (hours) | | | |
|---|---|---|---|---|
| | 0 | 6 | 24 | 48 |
| Control | 0 | 0 | 0 | 0 |
| 100.2 | 0 | 0 | 5 | 15 |
| 188.1 | 0 | 0 | 0 | 40 |
| 325.5 | 0 | 0 | 0 | 0 |
| 553.5 | 0 | 0 | 0 | 20 |
| 992.9 | 0 | 0 | 0 | 25 |

Values:

$EC_{50}$ (95% confidence limits) (mg/l)

| 24-hr | 48-hr |
|---|---|
| >992.9 | >100.2 |

NOEC (mg/l)

| 24-hr | 48-hr |
|---|---|
| 992.9 | 100.2 |

**Data Quality**

Reliability (Klimisch): 1A

Remarks: Reliable without restrictions; Guideline study (OECD TG-202).

**Reference**

Lawrence, D. L. and M. P. Hirsch. An Acute Aquatic Effects Test with the Daphnid, *Daphnia magna* using Hydroquinone bis (2-Hydroxyethyl) Ether. Eastman Kodak Company, Rochester, NY. Study No. EN-431-023646-1; HAEL No. 94-0220. 1995.

**Other**

## C. Acute Toxicity to Aquatic Plants

Robust summary will be supplied when available from study data.

## V. Mammalian Toxicity

### A. Acute Toxicity – Entry 1 of 2

**Test Substance**

| | |
|---|---|
| Identity: | Hydroquinone bis (2-hydroxyethyl) ether (CAS RN 104-38-1) |
| Purity: | Not stated |
| Remarks: | None |

**Method**

| | |
|---|---|
| Method/guideline followed: | Not stated |
| Type: | Oral toxicity |
| GLP: | Yes |
| Year: | 1989 |
| Species/Strain: | Rat/Crl:CD (SD)BR |
| Sex: | Male/Female |
| Number of animals/ sex/dose: | 5 |
| Vehicle: | 0.5% aqueous guar gum |
| Route of administration: | Oral (gavage) |
| Remarks: | One group of 10 rats (5M, 5F) was administered the test substance (25 % concentration in vehicle) at a dose of 5 g/kg. Animal weight was 182-197 g for males and 164-173 g for females. Animals were observed for mortality and clinical signs for 15 days. |

**Results**

| | |
|---|---|
| Value: | $LD_{50}$ is greater than 5 g/kg |
| Mortality rate: | No mortality |
| Remarks: | All animals appeared normal with no incidence of clinical signs of toxicity. All animals gained weight normally. No treatment-related changes were noted at necropsy from gross pathological examination. |

**Conclusions**

| | |
|---|---|
| Remarks: | The acute oral $LD_{50}$ is greater than 5 g/kg. |

**Data Quality**

| | |
|---|---|
| Reliability: | 2D |
| Remarks: | The study is reliable with restrictions. Data appear solid, but report lacks details consistent with a guideline study. |

**Reference**

Shepard, K. P. 1989. Acute toxicity of HQEE. Health and Environment Laboratories, Eastman Kodak Company, Rochester, NY. HAEL No. 89-0126.

**Other**

**Acute Toxicity – Entry 2 of 2**

**Test Substance**

| | |
|---|---|
| Identity: | Hydroquinone bis (2-hydroxyethyl) ether (CAS RN 104-38-1) |
| Purity: | Not stated |
| Remarks: | None |

**Method**

| | |
|---|---|
| Method/guideline followed: | Not stated |
| Type: | Dermal toxicity |
| GLP: | Yes |
| Year: | 1989 |
| Species/Strain: | Rat/Crl:CD (SD)BR |
| Sex: | Male/Female |
| Number of animals/ Sex/dose: | 5 |
| Vehicle: | Water. Test article was moistened with the vehicle. |
| Route of administration: | Dermal |
| Remarks: | One group of 10 rats (5M,5F) was administered the test substance (solid material moistened with water) at a dose of 2 g/kg. The test article was applied to the skin following hair removal with an electric clipper. An occlusive wrap was used to hold the test material against the skin for 24 hours. At the end of exposure, residual test material was washed off with water. Animal weight was 187-197 g for males and 169-191 g for females. Animals were observed for mortality and clinical signs for 14 days. |

**Results**

| | |
|---|---|
| Value: | $LD_{50}$ is greater than 2 g/kg. |
| Mortality rate: | No mortality |
| Remarks: | All animals appeared normal with no incidence of clinical signs of toxicity. All animals gained weight normally. No treatment-related changes were noted at necropsy from gross pathological examination. |

**Conclusions**

| | |
|---|---|
| Remarks: | The acute dermal $LD_{50}$ is greater than 2 g/kg. |

**Data Quality**

Reliability

| | |
|---|---|
| (Klimisch): | 2D |
| Remarks: | The study is reliable with restrictions. Data appear solid, but report lacks details consistent with a guideline study. |
| **Reference** | Shepard, K. P. 1989. Acute toxicity of HQEE. Health and Environment Laboratories, Eastman Kodak Company, Rochester, NY. HAEL No. 89-0126. |
| **Other** | |

## B. Genetic Toxicity

Robust summary for mutation and chromosomal aberration will be supplied when available from study data.

## C. Repeated Dose Toxicity

### Test Substance

| | |
|---|---|
| Identity: | Hydroquinone bis (2-hydroxyethyl) ether (CAS RN 104-38-1) |
| Purity: | 97.2% -- determined by gas chromatography with flame ionization detector |
| Remarks: | Stability of the test article in the diets was determined by repeated analysis on 0, 4, and 8 days and 2, 3, 4, and 5 weeks after diet preparation. Concentrations of the test article were (mean ± SD) 0.1 ± 0.02 % and 0.96 ± 0.03 % after 36 days of storage indicating the material was stable for the duration of the study. Target concentrations were 0.1 % and 1.0 %. Mean (± SD) concentrations of the diets used during the study were 0.099 ± 0.0008, 0.32 ± 0.02, and 0.98 ± 0.03 %. |

### Method

| | |
|---|---|
| Method/guideline followed: | OECD TG-407 |
| Test type: | Oral |
| GLP: | Yes |
| Species: | Rat |
| Strain: | CD(SD)BR |
| Number and sex: | 5 males and 5 females/group. Weight (mean ± SD) at the start of the study for males and females was 162 ± 6 g and 146 ± 6 g, respectively. |
| Route of administration: | Oral (incorporation into the diet) |
| Duration of test: | 28 days |
| Concentration level: | 0.1, 0.3 or 1.0% (rounded) in the feed. The concentrations correspond to dose levels of 85, 249 or 848 mg/kg/day in the males and 81, 262 or 851 mg/kg/day in the females, respectively. |
| Exposure period: | 28 days |
| Frequency of treatment: | Test article was continuously available throughout the 28 day exposure period. |
| Control group and treatment: | Yes; concurrent using diets containing 1% corn oil. |
| Post-exposure observation period: | None |
| Methods: | Body weights were collected on days 0, 3, 7, 14, 21 and 28. Feed consumption was determined on days 3, 7, 10, 14, 17, 21, 24 and 28. Clinical |

observations were performed daily and included, but were not limited to, examination of fur, skin, eyes, motor activity, feces and urine. Blood was collected at necropsy for hematology (hemoglobin concentration, hematocrit, red and white blood cell count, differential white blood cell count, platelet count, red blood cell indices (MCV, MCH, and MCHC) and examination of blood smears for cellular morphology and clinical chemistry (aspartate aminotransferase, alanine aminotransferase, sorbitol dehydrogenase, alkaline phosphatase, creatining, urea nitrogen (BUN), and glucose) tests. Organ weights were taken for liver, kidneys, adrenal glands, testes, spleen, and thymus. The following tissues from the control and high dose groups were fixed in formalin and examined histopathologically: trachea, lungs, heart, esophagus, stomach, duodenum, jejunum, ileum, cecum, colon, pancreas, liver, salivary glands, kidneys, urinary bladder, pituitary gland, adrenal glands, thyroid gland, parathyroid glands, thymus, spleen, mesenteric lymph nodes, bone marrow (femor), brain, testes, epididymides, male accessory sex glands, ovaries, vagina, uterus, fallopian tubes, and gross lesions. Mean values were calculated for body weight, feed consumption, organ weights, hematology and clinical chemistry. All mean data, except feed consumption, were evaluated using the following computer-generated statistical tests: Bartlett's test ($p \leq 0.01$), one-way analysis of variance ($p \leq 0.05$) and Duncan's multiple range test ($p \leq 0.05$) to indicate statistical significance. Feed consumption was not analyzed statistically because the animals were group housed.

Remarks: Protocol written and followed as per stated guideline with no deviations.

**Results**

NOAEL (NOEL): Male rats – 0.3 % in the diet (249 mg/kg)
Female rats – 1.0 % in the diet (851 mg/kg)

LOAEL (LOEL): Male rats – 1.0 % in the diet (848 mg/kg)
Female rats – Could not be determined as the NOAEL was the highest dose tested.

Remarks: No mortality occurred during the study. There were no treatment-related clinical signs of toxicity observed during the study. There were no statistical

body weight differences between any of the treated animals and control animals. Feed consumption was comparable for all animals in the treated groups and control group. In the mid-dose males hemoglobin concentration was slightly higher compared to the control males (P=0.05), but there was no dose response relationship as the hemoglobin concentration in the low- and high-dose males was not statistically significantly different from controls. The mean blood platelet count for the high-dose males was slightly less (p=0.02) than for the control group. Platelet counts were not statistically significantly different from controls in the mid- and low-dose males. No other abnormalities in hematology were noted in the males. No hematological abnormalities were observed in any of the female animals. The clinical chemistry findings in all treated animals were comparable to controls. Relative kidney weights in low- and mid-dose females were lower (p=0.02), but not different from controls in the high-dose females. Absolute kidney weights for all treated female animals were similar to controls. No other organ weight differences were seen in any dose group for either sex. No compound-related lesions were seen during gross or histopathological examinations.

**Conclusions**

Remarks: The test article appears to reduce the platelet count in males at the top dose (848 mg/kg). 249 mg/kg is the NOEL for this effect. The decrease in relative kidney weights in the low- and mid-dose females is judged to be of no toxicological significance for 3 reasons. Absolute kidney weights were not affected in any of treated female animals, relative kidney weights were not different from controls in the high-dose females, and no gross or histopathological change was noted in this organ from any treatment group.

**Data Quality**

Reliability (Klimisch): 1A

Remarks: Reliable with restrictions. Guideline study (OECD TG-407)

**Reference:** Hosefeld, R. S. and G. J. Hankinson. 1988. Four Week Oral Toxicity Study of Hydroquinone Bis (2-Hydroxyethyl) Ether in the Rat. Report number 87-0068. Toxicological Sciences Laboratory, Eastman Kodak Company, Rochester, NY 14650.

**Other**

## D. Reproductive and Developmental Toxicity

Robust summary for reproductive and developmental toxicity will be supplied when available from study data.

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